STATEMENT
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The Nuclear Energy Institute (NEI) appreciates the opportunity to provide this testimony for the record on reprocessing used fuel from commercial nuclear power plants. The nuclear energy industry recognizes that safe, secure and efficient management of the nation's used nuclear fuel is critical to ensuring nuclear energy's future contribution to our nation's energy supply.

NEI is responsible for developing policy for the U.S. nuclear energy industry. Our organization's 250 member companies represent a broad spectrum of interests, including every U.S. energy company that operates a nuclear power plant. NEI's membership also includes nuclear fuel cycle companies, suppliers, engineering and consulting firms, national research laboratories, manufacturers of radiopharmaceuticals, universities, labor unions and law firms.

America's nuclear power plants are the most efficient and reliable in the world. Nuclear energy is the largest source of emission-free electricity in the United States and our nation's second largest source of electricity after coal. Nuclear power plants in 31 states provide electricity for one of every five U.S. homes and businesses. More than eight out of 10 Americans believe nuclear energy should play an important role in the country's energy future.[1]

Given these facts and the strategic importance of nuclear energy to our nation's energy security and economic growth, NEI encourages Congress to maintain policies that ensure continued operation of our nation's nuclear plants, and to provide the impetus required to expand emission-free nuclear energy as a vital part of our nation's diverse energy mix.

[1] Bisconti Research Inc./NOP World, May 2005, Survey of 1,000 U.S. adults with a margin of errors at +/- 3 percentage points. Question: "How important do you think nuclear energy will be in meeting this nation's electricity in the years ahead? Do you think nuclear energy will be very important, somewhat important, not too important, or not important at all?" Reponses: 83% important, 13% not important, 4% don't know.

This testimony makes four important points:

- Reprocessing could play an important role in the future of nuclear energy by providing needed nuclear fuel supplies, but it must be part of an economic nuclear fuel cycle;
- Current reprocessing technology offers limited assistance to used nuclear fuel disposal, but has the future potential to provide benefits that will make disposal more efficient and cost effective;
- Potentially, reprocessing in the United States and other reliable nations could further non-proliferation goals, but the additional costs associated with reprocessing to achieve these goals should not be borne by the electricity consumer; and
- The federal government should put in place firm, long-range policies that support reprocessing and pursue the research, development and demonstration of new, improved, proliferation-resistant reprocessing technologies.

INDUSTRY CONSENSUS

The fuel used by nuclear power plants in the United States comes from newly mined uranium or uranium that has been derived from nuclear weapons from the former Soviet Union and blended down to a much lower enrichment level that is appropriate for commercial reactors. The cost of nuclear fuel is an important component and it accounts for 25 percent of the production cost of electricity from nuclear plants. Uranium must be processed through milling, conversion, enrichment, and fabrication to be made into nuclear fuel usable in power reactors.

The safe and efficient management of used nuclear fuel rods is a critical component of the nuclear energy industry's exemplary record of safety and environmental stewardship. The federal government is developing a specially designed, underground repository at Yucca Mountain, Nev., to manage used fuel from our nation's commercial reactors and defense sites. The Yucca Mountain program has made significant progress over the past few years and is expected to move into the licensing phase in the near future.

The consensus in the nuclear energy industry is that nuclear fuel costs should be kept as low as possible, consistent with the need for a competitive long-term fuel supply. Doing so may require reprocessing nuclear fuel to provide fuel supplies well into the future, but that period is difficult to predict. There are numerous unknown factors, such as future demand and cost of uranium, the cost of reprocessing and the reprocessing technology to be used.

The re-emergence of nuclear energy in the United States, together with rapidly expanding nuclear energy sectors in nations such as China and India, will place additional pressure on uranium supplies and increase uranium prices still further. This could increase the attractiveness of reprocessing, but would do so only at prices that are well above today's market. Reprocessing also would increase access to fuel supplies by making recycled fuel available and thereby reduce the volume of uranium imported by the United States.

In a "closed" fuel cycle, fuel from reprocessing would be another avenue of supply for the nuclear fuel market. Utilities would evaluate supplies from reprocessed fuel and the use of mixed-oxide fuel in the same way they consider the variety of suppliers of new fuel today.

These factors include cost, reliability and diversity of supply; quality of fuel; and the effect of the fuel on reactor core design. Long-term business planning would be affected in terms of supplier and fuel design, but only if the overall costs are equal to or lower than fuel from current suppliers.

Developing new reprocessing technologies for used nuclear fuel in the United States also offers the long-term potential for aiding used nuclear fuel disposal and furthering global non-proliferation goals. At the moment, the United States does not have the policies, the technologies nor the infrastructure in place to support reprocessing.

In 2001, President Bush's energy plan called for development of "…reprocessing and fuel treatment technologies that are cleaner, more efficient, less waste intensive and more proliferation resistant."[2] The nuclear energy industry supports this goal. U.S. leadership in nuclear energy research and development is vital to our national interests and will result in a safer world by safeguarding nuclear weapons material and technologies.

REPROCESSING IS A WORTHY FUTURE GOAL, BUT HAS CHALLENGES TO OVERCOME

Of the 33 nations that use nuclear power, 12 reprocess used nuclear fuel for a variety of reasons. France, Japan and the United Kingdom use Purex technology for their reprocessing programs, which recycle used reactor fuel safely and securely. Japan will continue to use reprocessing facilities in France and Britain until its Rokkasho Reprocessing Plant opens in the near future at a reported cost of $18 billion. It is worth noting that all these facilities were paid for through some form of government funding.

Future reprocessing of used nuclear fuel is a worthy goal, but it must overcome several challenges before it can be used in the United States. Currently, the cost of nuclear fuel from reprocessing is more expensive than new production of fuel. Any reprocessing also requires massive and expensive facilities, similar to large chemical plants, that the public or private sector must develop and license with the U.S. Nuclear Regulatory Commission. In the end, the use of reprocessing would not lessen the need for a national repository, but it would reduce the volume of material to be managed at the facility. Other byproducts, radioactive and non-radioactive, from the reprocessing plant also must be managed. In addition, reprocessing poses security considerations that governments worldwide must address.

Current reprocessing technology makes it possible to recycle and reuse uranium and plutonium from commercial nuclear fuel. This is done by separating radioactive waste from uranium and plutonium that still contain energy. The reusable fuel can be returned to reactors, but only after significant additional processing and fuel fabrication in specially designed and licensed facilities. In addition, the same long-lived radioactive waste products remain and ultimately require disposal. With current technology, the recycled material has a limited life time and will eventually require disposal. Countries that currently reprocess nuclear fuel also are working to develop geologic repositories.

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[2] "National Energy Policy – Report of the National Energy Policy Development Group," May 2001

Until the mid-1970s, the U.S. government encouraged reprocessing using the Purex process, which chemically separates plutonium from uranium in the fuel rods. This process was first used to produce plutonium for the nuclear weapons program. Later, commercial reprocessing facilities were established in Barnwell, S.C.; Morris, Ill.; and West Valley, N.Y. President Gerald Ford suggested suspending the use of reprocessing in 1976 in view of nonproliferation concerns relating to plutonium. President Jimmy Carter acted on the ban the following year. President Ronald Reagan lifted the ban on reprocessing in the 1980s, but economic factors prevented any new investment in the technology. The ban was reinstated under President Bill Clinton and remains in effect today.

Early commercial reprocessing ventures in the United States were not successful. The West Valley facility operated for a short period of time in the late 1960s and early 1970s, then was shut down because of rising costs and regulatory uncertainties. It took a federal program and funding to clean up the facility. The Morris facility never operated because of technical difficulties and serves today as a used nuclear fuel storage facility. The Barnwell facility was not completed because of rising costs, falling uranium demand in that era and regulatory uncertainty.

The difficulties encountered by these early efforts need to be addressed in any reprocessing program going forward. Foremost among these is the need for a firm, unchanging national policy that supports development of reprocessing and a set of regulatory standards and implementing guidelines tailored to reprocessing plants.

REPROCESSING CAN REDUCE WASTE VOLUME, BUT YUCCA MOUNTAIN IS STILL NEEDED

No technology can destroy radioactivity from used nuclear fuel and other high-level radioactive wastes, nor is there a proven means to shorten the time that the material is radioactive. Reprocessing can only separate the various radionuclides and change their chemical and physical form. Scientists are studying technologies, such as accelerator- and reactor-based transmutation, that may eventually reduce the radioactivity in used nuclear fuel. However, none of these could eliminate radioactivity altogether. Any program involving reprocessing, transmutation or related technologies must be undertaken in conjunction with a federal repository.

Disposal capacity for used nuclear fuel should not be a deterrent to future expansion of nuclear energy. Depending on future industry expansion, additional used nuclear fuel disposal capacity will be needed, but it is impossible at this time to know when and how much capacity will be needed. Federal policies must consider all contingencies and remain flexible.

The Nuclear Waste Policy Act limits Yucca Mountain's capacity to 70,000 metric tons (MT) of used nuclear fuel or the high-level radioactive waste derived from 70,000 MT of used nuclear fuel. Current plans call for 63,000 MT of commercial used fuel and 7,000 MT of defense used nuclear fuel or the high-level waste derived from used fuel. The Department of Energy estimates that there will be at least 70,000 MT at various sites throughout the United States when the Yucca Mountain repository opens.

Congress established the capacity limitation on Yucca Mountain artificially, not by technical analysis. If the capacity of Yucca Mountain were to be increased to its technical limit, it still might not be enough to preclude the need for a second repository given the expected expansion of nuclear energy. However, reprocessing could reduce the volume of waste and possibly make additional repositories unnecessary.

In addition, current reprocessing of used fuel from commercial nuclear power plants could reduce the number of used fuel containers needed to store, transport and dispose used nuclear fuel, which would lower the cost of DOE's waste management program. This needs to be explored further as a possible benefit from reprocessing.

REPROCESSING MUST OVERCOME COST, BUT NOT AT THE EXPENSE OF NUCLEAR ENERGY

The debate over reprocessing of used nuclear fuel in the United States is longstanding. Reprocessed fuel is more expensive than new uranium oxide fuel. In addition, reprocessing requires new capital-intensive facilities and other infrastructure that must be licensed by the Nuclear Regulatory Commission.

The use of reprocessing would require significant investment. New fuel fabrication and enrichment facilities also will be needed. Federal agencies, such as the Nuclear Regulatory Commission, must license and provide independent government oversight of these new facilities. All of this will take many years to accomplish.

If the federal government determines that used nuclear fuel should be reprocessed, nuclear energy consumers should not bear the additional costs of reprocessing. Unlike other energy sources, the nuclear power sector covers the costs of its "externalities," including nuclear power plant decommissioning and used nuclear fuel disposal. Under the Nuclear Waste Policy Act, the federal government collects fees (one-tenth of a cent per kilowatt-hour from consumers of electricity generated at nuclear power plants) that are intended to pay for Yucca Mountain and associated programs. No other energy source covers its waste management costs in this manner. Assessing an additional fee for reprocessing would unnecessarily raise the cost of nuclear-generated electricity and create an inequitable situation that would harm the competitiveness of the U.S. energy sector.

NON-PROLIFERATION GOALS CAN BE ADVANCED BY REPROCESSING DEVELOPMENT IN THE UNITED STATES

Non-proliferation is the other principle challenge facing reprocessing, because current reprocessing technology yields separated plutonium. In sophisticated hands and with the right expertise and facilities, plutonium recovered from commercial reactor fuel can be made into a crude nuclear weapon. Opposition to the reprocessing initiatives in North Korea is based on concerns over the production of plutonium for nuclear weapons. However, after being used in mixed oxide reactor fuel (MOX), plutonium is less suitable for weapons applications. The United States recently began testing weapons-grade plutonium fabricated into MOX fuel as a means of eliminating plutonium.

The United States should pursue proliferation-resistant reprocessing technologies. By developing reprocessing in the United States and other reliable nations, we can better assure a fuel supply for the global nuclear energy sector and limit the risks associated with reprocessing.

DOE is investigating several new technologies as part of its Advanced Fuel Cycle Initiative. These include the Urex process, which recovers the uranium for disposal as low-level radioactive waste. Another technology now undergoing research is pyroprocessing, which retains the uranium and plutonium for use in a fast reactor.

The industry fully supports the development of advanced fuel cycles to improve the efficiency of nuclear power facilities. Further research in reprocessing and other technologies could yield important benefits. It is important that the government begin laying the foundation now for future nuclear fuel supply and waste treatment processes, as these take many years to develop and implement. However, DOE and other federal agencies should carry out this research in addition to existing waste management programs.

CONCLUSIONS AND RECOMMENDATIONS

Reprocessing used nuclear fuel has the potential to provide numerous benefits, but also poses multiple challenges. The implications of resuming reprocessing the United States must be fully understood before embarking on any large-scale initiative. The industry fully supports the administration's goal of developing nuclear fuel that is yet safer, more efficient and more proliferation-resistant. The federal government is well-served by the development of fuel technologies that support these objectives, including technologies pursued as part of the Advanced Fuel Cycle Initiative. However, the government must develop these technologies parallel with the development of Yucca Mountain and in a manner that will make the Yucca Mountain repository more efficient. Reprocessing could help avoid or delay the need for a second repository.

Development of these technologies in the United States and other reliable nations will make the world safer. However, despite its advantages, reprocessing has several key challenges that must be overcome, including cost and non-proliferation issues. Even with significant increases in uranium prices and the rising costs of on-site fuel storage, reprocessed fuel is still more expensive than nuclear fuel from current sources. Reprocessing will require investment in new infrastructure, but this investment should not be borne by a tax on consumers of nuclear energy. Consideration of reprocessing technologies also must take into account the proliferation risks of separated plutonium.

Congress must ensure that federal agencies are conducting research and development programs in areas such as reprocessing that help prepare for our nation's energy future. The government must do all it can to ensure that Americans continue to have access to affordable and environmentally friendly sources of electricity. Nuclear energy plays an important role in providing this power reliably, efficiently and without producing greenhouse gases.